UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,977	06/02/2001	Ron McCabe	1735.2.2J	3297

20575   7590   01/31/2006

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EXAMINER
LIN, WEN TAI

ART UNIT	PAPER NUMBER
2154	

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/873,977	MCCABE ET AL.
	Examiner	Art Unit	
	Wen-Tai Lin	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>21 December 2005</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>4-11,17-24,29-31 and 42-44</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>4-11, 17-24, 29-31 and 42-44</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____.

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 4-11, 17-24, 29-31 and 42-44 are presented for examination. Claims 35-

37 have been canceled.

2.   The text of those sections of Title 35, USC code not included in this action can be

found in the prior Office Action.

3.   Appliant correctly pointed out that Chen of U.S. PGPub. No. 20040233910

(instead of Sekido) was not a prior art due to the effective filing date of the instant

application is earlier than that of Chen. Consequently, this office action is made non-

final.

4.   The rejection of claims 6, 21, 30, 36 and 43 under 35 U.S.C. 101 for being

claiming non-statutory subject matter is maintained because the amended claim

language still does not make the storage medium tangibly embodied in a manner so as

to be executable (e.g., causing a computing device to execute the program stored in the

medium). As a sample example, Applicant could replace the first line of the **original**

claim 6 to the following: "A computer-readable storage medium tangibly embodying a

sequence of instructions executable by a computer to perform a method comprising:"

and maintain the rest of the claim as method steps.

5.   Claims 9-11 are rejected under the first paragraph of 35 U.S.C. 112 for not

conveying a concise and exact definition in the term ``virtual block allocation structure,"

which is a critical element in enabling a skilled person in the art to make and use the

same, while such definition is not found either in the claim language or in the

specification. (Note that Applicant's argument regarding the rejection is not deemed to

be persuasive, therefore the rejection stands – see paragraph # in this office action).

6.   Claims 42-44 are objected to because it is not clearly understood what is meant

by "a plurality of previous current sets" in the amended claims 42-44. That is, since

Applicant defines at the Specification paragraph 171 that a "current set" may be viewed

as an abstraction of a disk drive, "a plurality of previous current sets" would then be

interpreted as "a plurality of previous abstraction of disk drives". On the other hand, the

claim language states that "a current copy of mirrored data elements" is the mirrored

data elements that are stored on the same physical storage system (i.e., it does not

have anything to do with the abstract of a disk drive). For prior art rejection in this office

action the phrase: "representing a plurality of previous current sets" is construed as a

conclusary statement because both the current copy and the ordered queue are pre-

defined in the claim. Furthermore, the statement: "it is not necessary to write the same

data element twice to the storage system to implement a physically partitioned system"

is also perceived as a conclusary statement because of the word "whereby" preceding

this part of claim language.

Claim Rejections - 35 USC § 102

7.   Claims 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by

Stallmo et al. [U.S. Pat. No. 5787459].

8.   As to claims 17-18, Stallmo teaches the invention substantially as claimed

including: a method for data mirroring [col.15, lines 53-57], comprising the steps of

mirroring data, snooping a SCSI bus [col.9, lines 39-41], and buffering at least one

command obtained by the extracting step, wherein the commands include read nature

commands and write nature commands [col.8, lines 22-31; note that inherently the

captured read/write command is buffered so as to be relayed to other MCUs].

9.   As to claims 19-20, Stallmo further teaches the step of transferring buffered

commands from a first mirroring unit to a second mirroring unit across a communication

link and replaying from a second mirroring unit commands which were buffered by a first

mirroring unit [Abstract lines 19-24; col.5, lines 42-54; col.15, lines 53-57; note that

mirroring units are allocated among the MCUs].

As to claims 21-24, since the features of these claims can also be found in claims 17-18

and 20, they are rejected for the same reasons set forth in the rejection of claims 17-18

and 20 above.

10.   Claims 4-8, 29-31 and 42-44 are rejected under 35 U.S.C. 102(e) as being

anticipated by Ofek et al.[U.S. Pat. No. 5889935].

11.   As to claim 4, Ofek teaches the invention as claimed including: a method for

data mirroring, comprising the steps of mirroring data and storing changed logical block

numbers in a buffer rather than storing changed data in the buffer [e.g., col.17, lines 19-

32; col.36, lines 14-65; i.e., the LRU queue (503 of Fig.18) or link queue (504 of Fig. 18)

contain only pointers to data (in units of blocks or tracks) in cache. In particular, the

transmission link buffer 504 stores only pointers to the cache data (which inherently

includes changed or overwritten data) that is to be transferred to a remote storage].

12.   As to claim 5, Ofek further teaches that the step of changing a logical block

number in place in the buffer to reference data at a second location rather than

referencing data at a first location when a block corresponding to the logical block

number is overwritten, the first location holding data for the block before the block is

overwritten and the second location holding data for the block after the block is

overwritten [Note that, as a function of a queen, wherever a pointer is removed from the

head of the queue, the second-in-line pointer is automatically advanced to the head of

the queue. Thus it is equivalent to say that the content of the first pointer of the queue is

changed in place; see 544-545, Fig.21 and col.40, lines 8-31].

13.   As to claim 29, Ofek teaches the invention as claimed including: a method for

data mirroring, comprising the steps of reading a block of data from a local mirror,

writing that block of data to a temporary storage as a new block, updating a logical block

number entry in a queue, writing the new block to a collection of mirror data, and adding

a new block logical block number entry to the queue [see abstract; col.17, lines 19-32;

col.36, lines 14-65; note that the block data is written into a link buffer 505, while the

block's logical number is written into a link transmission queue 504].

14.   As to claims 42-44, Ofek teaches the invention as claimed including: a method

for data storage management, comprising the steps of reading data and maintaining an

ordered queue of mirrored data elements and a current copy of mirrored data elements

on the same physical storage system [e.g., 504 and 505 of Fig.18 form an ordered

queue, which is on the same physical storage system of a current copy (223a of

Fig.18)], the ordered queue and the current copy representing a plurality of previous

current sets, whereby it is not necessary to write the same data element twice to the

storage system to implement a physically partitioned system [note that Ofek's local

cache of 228, Fig.18 works toward the mentioned features because of the fact that the

link queue (504, Fig.18) maintains the order of data pointers which relate to data

elements stored in the link buffer 505. Thus 504 and 505 together maintain a current

copy of mirrored data elements on the same physical storage system and the ordered

queue (504, 505) and the corresponding elements in the primary volume (such as 223a)

form a plurality of previous current sets].

15.   As to claims 6-8 and 30-31, since the features of these claims can also be found

in claims 4-5 and 29, they are rejected for the same reasons set forth in the rejection of

claims 4-5 and 29 above.

Claim Rejections - 35 USC § 103

16.   Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek et

al. (hereafter "Ofek") [U.S. Pat. No. 5889935], as applied to claims 4-8, 29-31 and 42-44

above, further in view of Beal et al.(hereafter "Beal") [U.S. Pat. No. 6237008].

17.   As to claim 9, Ofek does not specifically teach that the storing means comprises

a virtual block allocation structure.

       However, in the same field of endeavor, Beal teaches that the data storage

system comprises virtual storage volumes [Beal: Abstract].

       It would have been obvious to one of ordinary skill in the art at the time the

invention was made that Ofek's storage means could also be constructed as virtual

storage volumes because it is well known that a virtual storage system is more robust to

changes in storage hardware [Beal: col.1, lines 58-67].

18.   Claims 10-11 would be allowable if rewritten or amended to overcome the

rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office Action and to

include all of the limitations of the base claim and any intervening claims.

19.   Applicant's arguments filed on 12/21/2006 for claims 4-11, 17-24, 29-31 and 42-

44 have been fully considered but they are not deemed to be persuasive.

20.   In the remarks Applicant argues:

        (i) Re. claims 4, 6 and 8: Ofek does not teach the claimed invention because the

cited LRU queue contains pointers to unused blocks and the cited link queue contains

read or write commands, not the changed block numbers.

        (ii) Re. claims 5 and 7: Ofek does not teach changing the step of logical block

number in place in the buffer.

        (iii) Re. claims 29-31, Ofek does not teach the stesp of reading a block of data

from a local mirror.

        (iv) Re. claims 42-44: Ofek does not teach an ordered queue and a current copy

representing a plurality of previous current sets.

21.   The examiner respectfully disagrees with Applicant's arguments.

        1. As to point (i): Ofek at col.17, lines 19-26 clearly disclosed that the entries in

the queue contain pointers to the data in cache. As such the "entry" at col.36, lines 59-

61, as pointed out in Applicant's argument, must be referring to the pointer, rather than

the read/write command, because each read/write command is associated with a

pointer pointing to the location of a data element to be read or written. Furthermore,

even the feature of LRU queue reads on the claim because unused blocks in a cache

are usually associated with data that has been nullified via, e.g., deletion or marking as

expired (which is a form of data change).

2. As to point (ii): Based on the teaching at col.40, lines 8-23, Ofek clear teaches

that when the pointer at the top of the queue is removed after finished execution of a

relavent read/write task, a second pointer in the queue is advaced to the top for

subsequent task. The nature of a queue operation changes the pointer contents in

place.

3. As to point (iii): Pfek teaches a remote mirroring of data between a primary

volume and a secondary volume, wherein the host computer has direct access to the

primary volume [Abstract, lines 2-8]. Such a primary volume constitutes the so called

"local mirror" because it is relatively local to the host and it mirrors the remote

secondary volume.

4. As to point (iv): See paragraphs 6 and 14 in this instant office action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Wen-Tai Lin whose telephone number is (571)272-3969.

The examiner can normally be reached on Monday-Friday(8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571)272-3964. The fax phone numbers for the organization where this application or proceeding is assigned are as follows:

        (703)872-9306 for official communications; and

        (571)273-3969 for status inquires draft communication.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wen-Tai Lin

January 25, 2006